

A New Species of *Pristiloma* (Gastropoda: Zonitidae) from a California Cave

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Abstract. *Pristiloma cavator*, sp. nov., is described from Samwel Cave, Shasta County, California. *Pristiloma juniperum* Smith, 1957, is a synonym of *Pristiloma spelaenum* (Dall, 1895); *P. spelaenum* is regarded as a distinct species, not a subspecies of *Pristiloma subrupicola* (Dall in Packard, 1877). A prior lectotype designation for *P. spelaenum* is invalid.

INTRODUCTION

Shells of the following new taxon were collected by explorers of Samwel Cave, Shasta County, California, on several occasions between 1957 and 1959. Most are more or less eroded and/or encrusted with reddish-brown, calcareous cave deposit. Bird and mammal bones and other land snail remains from Samwel Cave have been thought to range from late Pleistocene to early Holocene in age (Miller, 1933; Treganza, 1964; Graham, 1967; Payen et al., 1978). Several other species of land snails recovered from deposits in Samwel Cave were later found living in the same area (Walton, 1970; Roth, 1981; Roth, unpublished data), and there is no obvious difference between the cave snail faunule and the Recent snail fauna. However, field work in the area by other snail biologists and myself has failed to locate living populations of this species to date. It is therefore described on the basis of cave shells. We might have suspected that the species was extinct, except that one specimen out of 121 examined contained dried-in remains of the animal.

The following abbreviations are used: ANSP, Academy of Natural Sciences of Philadelphia; BR, author's collection, San Francisco, California; CAS, California Academy of Sciences; FMNH, Field Museum of Natural History; SBMNH, Santa Barbara Museum of Natural History; USNM, National Museum of Natural History, Smithsonian Institution.

SYSTEMATICS

Family ZONITIDAE Mörch, 1864

Pristiloma Ancy, 1887

Type-species: *Zonites stearnsi* Bland, 1875; by subsequent designation (Baker, 1930).

Zonitidae with shell small to minute; discoidal, hemispheric with deep, convex base and spire scarcely raised, or depressed-helicoid; colorless, yellowish, reddish

brown, or brownish olive, glossy, thin, transparent when fresh; with 3.5-7 closely coiled whorls. Umbilicus narrow to absent. Sculpture lacking in most species, except for weakly impressed collabral striae; some species with close, regularly spaced, radial grooves extending outward from suture, fading out at or above periphery. Aperture lunate; peristome simple or, less often, thickened within by weakly toothed transverse rib. Penial retractor muscle originating on floor of lung and inserting on epiphallus or summit of penis. Penis containing various forms of ridges or pilasters, but not spinelike papillae. Spermatheca and its duct usually well developed.

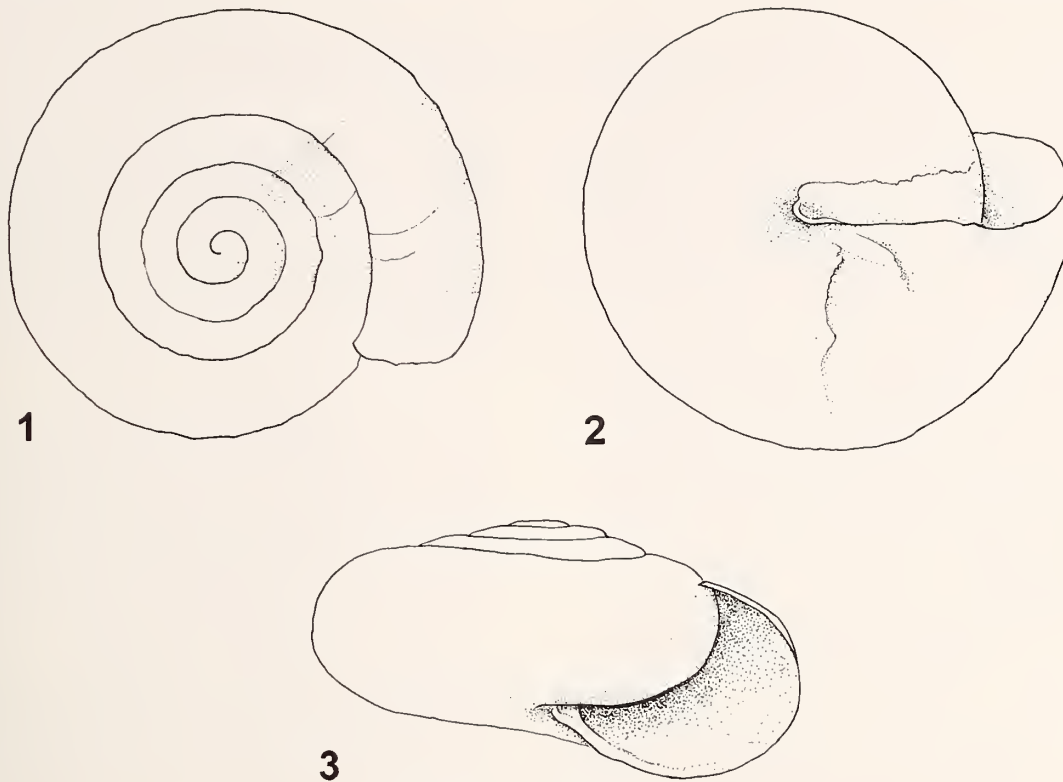
The genus ranges around the North Pacific rim from southern California to Japan, and inland in North America as far as Idaho, western Montana, and Utah. Seven other species are known from California; additional, unnamed species are under study.

Pristiloma cavator, sp. nov.

(Figures 1-3)

Diagnosis: A large, discoidal *Pristiloma* without umbilicus at any stage of growth; adult with inner end of basal lip joining with parietal callus to protrude as small callus tongue appressed over shell axis.

Description: Shell up to 5.0 mm in diameter, non-umbilicate, discoidal, with sloping shoulder; spire very slightly raised; with up to 4.7 steadily and regularly enlarging whorls; suture appressed but distinct; profile of spire whorls weakly convex. Periphery obtuse, looking as if slightly compressed toward shell axis. Base weakly convex, somewhat excavated centrally, crossed by shallowly sinuous, impressed collabral striae at irregular intervals, with extremely fine, close-set spiral striations apparent on well-preserved material; basal lip shallowly, doubly sinuous in basal view, produced in the middle. Aperture broadly lunate; peristome simple, not thickened; inner part of basal lip turned outward; extreme inner end



Explanation of Figures 1 to 3

Pristiloma cavator Roth, sp. nov. Holotype, SBMNH 144393. Top, basal, and apertural views. Diameter 4.9 mm.

joining with parietal callus to protrude as small tongue of callus appressed over shell axis. Parietal callus moderately thick, surface finely papillose. Shell solid for the genus, glossy and translucent when fresh, otherwise smooth and opaque white.

Dimensions of holotype: Diameter 4.9 mm, height 3.1 mm, whorls 4.6.

Type material: Holotype: SBMNH 144393, CALIFORNIA: Shasta County: Samwel Cave [SW¼ sec. 5, T. 35 N, R. 3 W, Mount Diablo Base and Meridian]. R. de-Saussure et al. coll. 5 June 1957.

Paratypes: CAS 112280 (2 specimens), BR 1915 (6), FMNH 293001 (2), SBMNH 144394 (12), USNM 860653 (2), ANSP 401179 (2), collection of Terrence J. Frest, Seattle, Washington (2). With same locality data as holotype.

Referred material: All, CALIFORNIA: Shasta County: Samwel Cave. BR 1909, R. E. Graham coll. 1958 (6). BR 1910, R. E. Graham coll. 1958 (1). BR 1911, R. E. Graham coll. 25 June 1959 (1). BR 1912, R. E. Graham coll. 10 June 1959 (1). BR 1913, R. E. Graham coll. 25 June 1959 (2). BR 1914, R. E. Graham coll. 25 June 1959 (2). BR 1916, "Area D," depth 0 ft 6 in [0.15 m], N.

Slusser coll. 4–7 June 1957 (10). BR 1917, "Area D," depth 0 ft 6 in [0.15 m], N. Slusser coll. 7 June 1957 (42). BR 1918, R. E. Graham coll. 5–6 January 1957 (1). BR 1919, N. Slusser coll. 5 June 1957 (1). BR 1920, 90 ft pit, total darkness, R. E. Graham coll. 11 June 1958 (2). BR 1921, R. E. Graham coll. 25 June 1959 (1). BR 1922, R. E. Graham coll. 19 December 1959 (1).

Remarks: The subgeneric taxonomy of *Pristiloma* is based on characters of the reproductive system (Baker, 1931; Pilsbry, 1946; Riedel, 1980). Until living material of *Pristiloma cavator* can be collected and dissected, the species is assigned only to the genus in the broad sense. A phylogenetic analysis of the species of *Pristiloma* is now in progress.

As in most Zonitidae, there is no change in spiral growth trajectory or turning out of the lip in *P. cavator* at adulthood. It is therefore not obvious among the material at hand which shells represent adult individuals, and size characterizations run the risk of including ontogenetic variation. However, in the material at hand, the diameter of shells with 4.0 or more whorls ranges from 3.3 to 5.0 mm (mean of 31 specimens including holotype, 4.15 mm; standard deviation 0.414). Many of these have

the basal callus tongue well developed, which may indicate a definitive stage of shell growth.

Lot BR 1917 consists of 42 specimens in stages of growth from 2.0 whorls up and demonstrates that at no point in ontogeny does *P. cavator* have an umbilicus.

Pristiloma cavator differs from the smaller (ca. 2.5 mm diameter; Pilsbry, 1946) *Pristiloma johnsoni* (Dall, 1895) of the Pacific Northwest in that the last whorl is less than twice the width of the preceding whorl. It differs from other discoidal, white to translucent-shelled species, including the Californian *Pristiloma nicholsoni* Baker, 1930, *P. shepardae* (Hemphill in W. G. Binney, 1892), *P. orotis* (Berry, 1930), *P. spelaenum* (Dall, 1895), and *P. gabrielinum* (Berry, 1924), in having no umbilicus at any stage of growth. The tongue of callus formed by an extension of the inner end of the basal lip and the parietal callus is similar to that present in *Pristiloma subrupicola* (Dall in Packard, 1877) from Utah, Idaho, and Oregon (see Pilsbry, 1946: fig. 226), but *P. subrupicola* has a narrow umbilicus.

Pristiloma spelaenum has been regarded since its description as a subspecies or "variety" of *P. subrupicola*. I have examined 11 samples of *P. spelaenum* in the California Academy of Sciences and my own collection. None of the specimens shows development of a callus extension in the umbilical region. *Pristiloma subrupicola* is anatomically distinctive in having a vaginal caecum containing an elongate papilla, a muscular sheath covering the penis, and the vas deferens passing through the sheath so that the epiphallus forms a loop. The positions of the origin and insertion of the penial retractor muscle also are different from those of other known *Pristiloma* species (Baker, 1931), and some authors place the species in the separate genus *Ogaridiscus* Chamberlin & Jones, 1929 (Riedel, 1980). *Pristiloma spelaenum* has not yet been dissected. In the absence of information about its reproductive system and penial musculature, assigning it the status of a subspecies of the anatomically distinctive *P. subrupicola* assumes facts not in evidence; I therefore regard it as a separate species.

In his original description of *Pristiloma juniperum*, Smith (1957) compared his new species to *P. gabrielinum* but not to *P. spelaenum*. The characters by which he distinguished *P. juniperum* from *P. gabrielinum* are also found in *P. spelaenum*, and I regard *P. juniperum* as a synonym of *P. spelaenum*.

In the paper by Smith (1957), the original figures of *Pristiloma juniperum* are transposed with those of a purported lectotype of *Vitrea subrupicola* var. *spelaea* Dall, 1895 (i.e., *Pristiloma spelaenum*). Smith's plate 2, figures 4–6 actually depict the holotype of *P. juniperum*; plate 2, figures 1–3 depict *P. spelaenum*. In addition, Smith

(1957) designated as lectotype of *Vitrea subrupicola* var. *spelaenum* a topotypic specimen (now CAS 055397) from the Henry Hemphill collection. There is no evidence that this specimen was ever seen by Dall, and therefore it cannot be part of the type lot. Smith's (1957) designation of it as a lectotype is therefore invalid, although the specimen might be a candidate for a neotype if Dall's original material is lost and the status of the species needs clarification. Boss, Rosewater, & Ruhoff (1968) did not report the location of any type material of *Vitrea subrupicola* var. *spelaea*.

Etymology: L., *cavator*, an excavator.

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